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RADIUM

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VOL. VII SEPTEMBER, 1916 No. 6

CONTENTS

Radium and Symptomatic Blood Pressure, Douglas C. Moriarta, M. D. . . . 129

Reviews and Abstracts. 136

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A MONTHLY JOURNAL DEVOTED TO THE CHEMISTRY
PHYSICS AND THERAPEUTICS OF RADIUM
AND RADIO-ACTIVE SUBSTANCES

RADIUM

A MONTHLY JOURNAL DEVOTED TO THE CHEMISTRY, PHYSICS AND THERAPEUTICS OF RADIUM AND RADIO-ACTIVE SUBSTANCES.

Edited and Published by Charles H. Viol, Ph. D., and William H. Cameron, M. D. with the assistance of collaborators working in the fields of Radiochemistry, Radioactivity and Radiumtherapy.

Subscription $2.50 per year, or 25 cents per copy in the United States and Canada in all other countries $3.75 per year.

Address all communications to the Editors, Forbes and Meyran Avenues, Pittsburgh, Pa.

VOL. VII. SEPTEMBER, 1916 No. 6

RADIUM AND SYMPTOMATIC BLOOD PRESSURE.*

By Douglas C. Moriarta, M.D.,

SARATOGA SPRINGS, N. Y.

I have two thoughts which I wish to present for your discussion to-day:—high blood pressure and its significance, and the use of radium for its relief.

The more I see of patients who have a symptomatic blood pressure, the more I am convinced that we do not give them the careful attention they require. These people are invariably moody and nervous, and the knowledge that their blood pressure is high is a constant menace to their health, as they live continuously in a state of apprehension. They are happy if the pressure is down 5 mm. to-day, and morose if it happens to be up 5 mm. to-morrow; notwithstanding the fact that this deviation from day to day is not more than the actual error of manipulation. They are usually uninformed as to the cause of the symptom, and apparently it has never been taken into consideration whether their individual index is a normal one for them or not.

So I believe that our patients should be taught the cause and significance of an increased blood pressure. This would allay the natural perturbation that is felt when they are informed of the presence of this symptom. As a rule, much of the nervousness and apprehension would not have occurred, or will disappear, when their condition is explained and they understand that a high blood pressure is only a *symptom*, and not a disease, *per se*. They should know that their increased pressure is probably a normal index for their pathological state;

*Medical Record, Vol. 89, No. 21, pp. 865-68, May 13, 1916.
Read before the Saratoga County Medical Society, May 3, 1916.

that its presence is essential if nature is to keep a balance in the performance of her functions; and that, while it is a symptom of a morbid condition, it is necessary, and one that will be present until the exciting cause is controlled. The best illustration we have of this statement is the number of people who go about perfectly happy, with a constant high blood pressure, until they discover that their pressure *is* high.

I do not intend to minimize the importance of this symptom, nor to suggest that it is not an anxious one. But I must deprecate the unfortunate influence which this knowledge seems to have upon our patients when they are simply told that their blood pressure is increased, without some explanation.

Consequently, when we are estimating the blood pressure of a patient and find that it is relatively high, we should go more into detail; tell him that it is the exciting cause and the pathological condition which are of importance and not the registered measure. He should be told that it is an index to either a functional or an organic derangement; that if the trouble is organic, the increased pressure is necessary, and is nature's method of balance; while if the trouble is functional, an effort will be made to control it by removing or correcting the exciting cause; and that this knowledge must be had, and this conclusion reached, in every individual case that carries an increased blood pressure, and that it is the only criterion.

It is a common observation that both physicians and patients are inclined to the continuous use of drugs to relieve high blood pressure. This is not good practice and should be avoided except to relieve some temporary condition.

It is well to lay particular stress upon the fact that patients often have a high index which is a normal one for the existing condition; that it is essential to their well-being and must not be interferred with. On the other hand, when we do meet high blood pressure which is a true hypertension, the welfare of the patient will be enhanced when it is controlled. In other words, no patient should be judged by comparison with any other patient, but only after a study of his individual case. In this way only will a safe working conclusion be reached.

So I urge that we explain to our patients that their increased blood pressure is an indication of a more or less complex condition, which may have been developing over a period of years; that it may be functional and involve the toxins of the alimentary tract; or it may be organic, involving the kidneys, heart; and blood-vessels. Explain that such a condition frequently occurs in a hard-working person who has an exacting business, which has been carried on under constant nervous strain, without periods of rest. Such an individual has, perhaps, been in the habit of eating quickly and irregularly, often being over-fed with rich, highly-seasoned, nitrogenous food. When to this are added tea, coffee, tobacco, and alcoholic stimulants, the individual, while still young in years, is old in fact. Thus, as Bishop states, "that which in early life was a case of indigestion, after many years of such living, has developed into a nephritis with a high blood pressure." Perhaps the condition may not have progressed so far as this; or it may have gone still farther, and degenerative changes may have occurred in the heart, kidneys, and blood-vessels. In the latter case if compensation gives out, we will probably have a secondary low blood pressure which is of serious omen.

I shall not attempt to describe the early, progressive, or late symptoms of arteriosclerosis, as I simply wish to call attention, at this time, to the baneful effect upon the patient's mental condition, of symptomatic blood pressure, when the reason for the presence of this symptom is not fully understood. The successful management of such a case is possible, I believe, only when the patient thoroughly understands its significance.

I have been treating patients with symptomatic blood pressure for years with our mineral waters, particularly those who have come to Saratoga for their health, and with uniformly good results. It has, of course, been necessary to correct the exciting cause, so far as possible, by a carefully regulated regime and not by the use of drugs. I have learned to value the Saratoga mineral waters as a therapeutic agent very highly. I am not unmindful of the benefit of a regulated life, such as is followed when one is taking a cure. I fully appreciate the "few-protein" diet of Bishop and the vegetable protein diet of Kellogg; and I recognize the importance of clearing the intestinal tract and increasing elimination by the use of salines and the alkalies, as well as the advantages of the omission of tea, coffee, alcohol, and tobacco, and the benefit to be derived from the use of mineral-water baths. Yet I imagine I see an effect beyond all these when one uses our Saratoga mineral waters therapeutically. I have also noted that they had a remote effect, *i.e.* a general betterment which was noticeable months after taking a course of treatment at the Springs. It has always seemed to me that the improvement I noted in my patients when using these waters could not be entirely accounted for by their chemical analyses, and that their action was unusual; and I have for many years expressed myself to that effect. I now believe this remarkable action to be due to their radium content.

It has been my experience that the blood pressure of a patient taking the cure will drop from 20 to 60 mm. of Hg. in a period of from four to six weeks, almost without fail. Of course, I exclude in this statement those in whom advanced cardiovascular or renal degeneration exists. All etiological conclusions concerning symptomatic blood pressure point to perverted metabolism as the primary cause, regardless of the terminal pathological symptom. Physiologically we are taught that radium stimulates the individual normal cell to increased action, or corrects a perverted cell action by its influence on the enzymes. It also affects the nervous system and produces dilation of the blood-vessels.

Clinically we know, beyond possibility of contradiction, that it increases very promptly the red blood cells, increases elimination from the kidney, in the quantity of both the water and the solid content of the urine; it also acts as a stimulant to peristalsis, thus being a mild cathartic and increasing in this way elimination from the alimentary tract; and it invariably produces a sensation of general well-being. Possibly small quantities of radium act as synergists, or perhaps the reverse is the case. In any event, mineral waters containing radium salts, or those that are radioactive, have their therapeutic possibilities materially increased.

The objection has been made that a few mache units of radium contained in a liter of our water could not act as I believe it does. It is, however, a recognized fact that radium possesses an almost incomprehensible catalytic power, even in infinitesimal doses; larger doses do undoubtedly possess added therapeutic possibilities.

After studying the reports of the physicians of the European spas and those from the London Radium Institute, I learned that they generally believed larger doses of radium emanation to be essential to the best therapeutic results; and that while their waters contain radium in larger quantities than our Saratoga mineral waters, yet they had found it helpful to fortify the action of the waters by the further use of radium element. I was impressed with their results, and decided to adopt their methods—this plan of treatment, therefore, I put into effect early in the spring of 1915.

I experienced quite some difficulty in adjusting my equipment for activating water and for inhalation purposes. I have, however, finally succeeded in arranging a very satisfactory outfit which answers my purpose admirably. I have for your cosideration some photographs of the apparatus which I trust will prove of interest. The features of more particular importance to which I desire to draw your attention are to following:

1. The subceiling effect, which reduces the cubic air space without the sensation of stuffiness.

2. The electric fans, which keep the air in motion, thereby making the treatment more agreeable.

3. The separate compartments within the emanatorium, together with an improved arrangement for distributing the emanation, make it possible to vary the quantity administered.

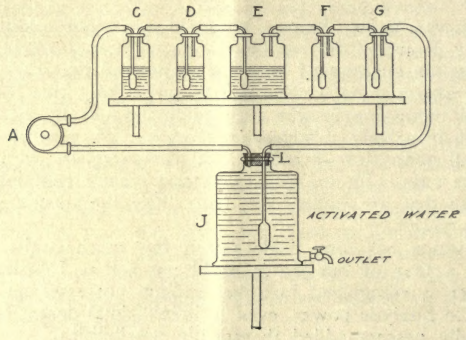
4. The provision which makes it possible to freshen the air in the emanatorium by the introduction of oxygen.

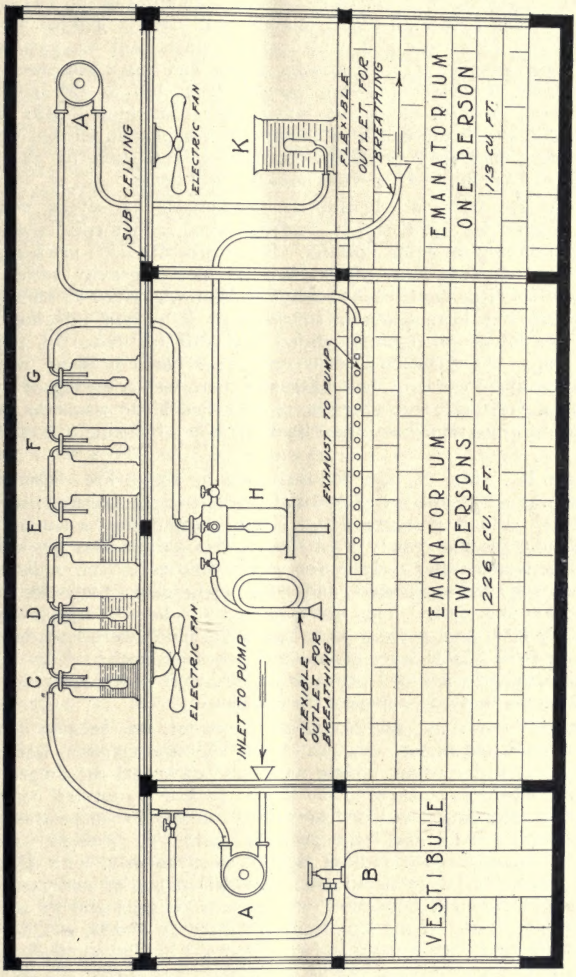
5. The arrangement for the removal of CO_2 from the atmosphere.

6. The apparatus for activating water is arranged so that there is very little lost space—therefore we have a high percentage of efficiency.

The entire outfit, although composed of several units, is so constructed that all or any part of the emanation can be thrown into either of the treatment rooms; this also applies to the apparatus which activates the waters.

During the past year I have treated fifty-six cases in which there was an increased blood pressure with radium emanation in addition to our mineral waters plus a regulated regime. These cases may be said to be too few to warrant the formation of an opinion concerning the possibilities of radium, particularly as over half of these patients were under observation only from four to eight weeks; nevertheless I do





believe that my experience has taught me that radium possesses valuable therapeutic properties. It will be interesting for you to know that in varying degrees there was in every one of the cases a lowering of blood pressure index and an increased red blood count. I desire to bring to your attention a few brief case histories that may serve to illustrate the above conclusions. My findings as a whole show that radium emanation lowers symptomatic high blood pressure, and I might add that even in cases showing advanced structural changes in the kidney, heart, and blood-vessels I have found it helpful.

Case I.—Mrs. F.; extremely nervous temperament; has always lived well; has a cocktail before dinner, and often a highball or wine with dinner. Has suffered with colonic stasis and its concomitant toxemia for several years; is anemic, sallow, and has a red blood count of 4,000,000, the blood pressure varying from 150 to 160 mm. She was ordered to drink radioactive water daily containing 15,000 m.u. in divided doses. At the end of a month her complexion cleared up; red blood count increased to 4,600,000, with a reduction of the blood pressure to 140 mm. and a general sense of well-being.

Case II.—Miss M., housewife, complained of severe neuralgic pains, malaise, loss of appetite, disturbed sleep, and torpid bowel; distressed breathing on going upstairs. Blood pressure 230; urine negative on repeated examinations, except that the specific gravity varied from 1004 to 1010. Red blood count 3,400,000. She was given 50 micrograms radium element intravenously, followed by a second injection three weeks later of 25 micrograms, with 1 liter (100,000 m.u.) of activated water daily. At the end of four weeks her blood pressure was 180, with a red blood count of 5,400,000, and there was a feeling of general betterment. At the end of eight months her blood pressure is 165; she has had no remedies other than periods of taking the activated water.

Case III.—Mr. B., age 76, merchant in active life. Complained of shortness of breath and precordial pain on slight exertion; no other symptoms. Blood pressure 230. Urine showed fine granular casts, no albumin; specific gravity 1004-1006. This patient was given 25,000 m.u. of activated water daily in four divided doses. After a distressing reaction it was discontinued, and tried again after forty-eight hours with 15,000 m.u. daily. This was also found to be too large a quantity, and finally 6000 m.u. per day were tolerated, which were later increased gradually until 30,000 were given in twenty-four hours. This resulted in a lowering of the blood pressure to 185, with a decided relief from the symptoms that had appeared on exertion.

Case IV.—Mr. S., age 74, master carpenter, was seen in consultation. Patient had intense dyspnea on the slightest exertion, was unable to lie prone, had constant cough, with mild edema of the lungs. Both legs were edematous nearly to the trunk; he had a ruptured compensation and a secondary low blood pressure of 105. The urine was loaded with albumin; small and large granular casts were present. He was given 50 micrograms of radium element intravenously, with 25 micrograms one week later; also 1 liter (100,000 m.u.) of activated water daily. In forty-eight hours his dyspnea was relieved and he was able to lie prone; edema of the legs entirely cleared up and he was decidedly more comfortable for a period of two weeks, when he suddenly died.

Case V.—Mr. D., age 56, in active life; has suffered from glycosuria for three years past. This condition is absolutely controlled by a regulated diet and life, except that he has a constant blood pressure of 158 to 165. This patient was given 40,000 m.u. of radium emanation in activated water daily which caused a distressing reaction. Eventually he could tolerate activated water containing 20,000 m.u. daily, and continued to take that amount for two months, with the result that his blood pressure was reduced to 120 mm. and remained under 130 for a year.

Case VI.—Mrs. K., housewife, 60 years old, an active, high-strung, nervous woman. Complained of continuously painful muscles, and

that she was not up to her regular duties—headache, malaise, loss of appetite, and disturbed sleep. Bowels regular. Blood pressure 190. Urine negative. I gave her ½ liter of radioactive water (50.000 m.u.) daily. After a period of four weeks blood pressure was 175 and she stated she had not felt so well in years.

Case VII.—Mr. S., janitor, age 60; hard-working, closely confined man. Is anemic and sallow, has digestive disturbance, and it not able to continue his duties. Blood pressure 185; hemoglobin 65; red blood count 4,800,000. Was given daily a liter of radioactive water, containing 100,000 m.u., for six weeks with a complete restoration of his well-being. Blood pressure 170; hemoglobin 80; red blood count 5,600,000.

I am aware that the indications for the use of radium emanation could not be determined from these few cases. This is so for two reasons: first, the small number of cases, and second, there is such a paucity of knowledge concerning the proper dosage.

I inaugurate a course of treatment with either radiocative waters, radium emanation by inhalation, or an intravenous injection of radium in the form of a soluble salt. The radioactive waters are given in doses ranging from 25,000 to 100,000 mache units of emanation per day, in divided doses after meals and at bedtime.

Radium emanation by inhalation is given daily in the emanatorium for a period of two hours— this daily treatment is further fortified by prescribing a varying amount of radiactive water taken at the beginning of the sitting and at the end of the treatment. The ordinary emanation content of my emanatorium shows 250 mache units of emanation per liter of air.

Radium element in the form of the soluble salts is given intravenously in selected cases either at the commencement of the treatment or after the response to the radioactive waters or the radium emanation by inhalation has not been sufficiently effective. As a rule, I follow the first injection with a second in two weeks, and vary the quantity from 10 to 15 micrograms of radium chloride. Administration of radium intravenously is always followed up with a course of waters and inhalation.

I would sound a note of warning, or at least urge precaution, in the use of large doses of radium emanation at the commencement of the treatment of any patient, as I have many times observed a special reaction from radioactive waters, such as severe headache, malaise, digestive disturbances, and a rise in temperature. When this supervenes the treatment should be discontinued for a day or two, after which the course can be resumed with about one-fourth of the original dosage and gradually increased until the desired result is secured. In this manner of procedure almost any amount of radium emanation can be administered.

There are other clinical points of importance which should be considered, but the time at my disposal will not permit their discussion.

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Reviews and Abstracts.

Joseph B. Bissell, M. D. (New York). Special Radium Needles in Use at the Radium Sanitarium of New York. American Medicine, XI, No. 7, pp. 520-1, July, 1916. "While in England last summer, the writer observed some very interesting results in the treatment of new growths in various parts of the body by the insertion of radium emanation in the body of the tumor. This emanation is inserted by means of very small glass capsules pointed at one or both ends, filled with emanation. These tiny glass bulbs (or seeds) are placed in the tumor by means of hollow needles whose calibre is large enough to carry the seed The needle, usually four to six inches long, is driven into the tissue of the tumor until it reaches approximately the center, then the glass containing the emanation is pushed down through the hollow air stem. A small obturator is used for pushing the bulb home. The needle and the obturator are withdrawn, leaving this glass bulb behind in the tissue. The patient either remained at the sanitarium during the treatment or returned to his home at a distance. As radiation takes place in every direction from the element as a center, this method of treatment seems a most attractive one, and is theoretically perfect as to the location of the application."

"In the service of Mr. Pinch, of the London Radium Institute, this treatment appears to have been quite successful. The same method is being carried out at the Huntington Cancer Research Laboratories in Boston by Dr. Duane, and also at the General Memorial Hospital in New York City."

"An objection to this treatment, a purely economical use of course, is that in order to obtain the emanation and use it frequently, a considerable amount of radium must be kept continually in solution. Only 16 per cent. of the emanation of radium in solution is obtained in the first twenty-four hours. In the next twenty-four hours 14 per cent. It takes four days to obtain 50 per cent. For the emanation to equal the amount of radium in solution or to reach equilibrium requires twenty-eight days. A good deal of time is thus required to procure the emanation. In a very active service, this is a great drawback. Another possible objection is that the little seeds left deeply seated in the tumor may become a possible source of irritation and in-

fection. Unlike the radium itself, the emanation has not a long life, its effect decreasing very rapidly. It reduces itself 50 per cent. in 3.85 days, and in twenty-eight days its usefulness has entirely gone."

"It occured to the writer, that a series of hollow needles filled with varying amounts of radium would have the same effect as the insertion of the little glass seeds, and that this effect would be more thorough and exact, and permanent as long as the needle remained in position. The amount of the element thus supplied can be more accurately measured by using the radium itself than by the use of the unstable emanation. The needles may be used as well for radium applications in other cases, exactly as if the radium was in the ordinary brass, silver, glass, hard rubber, or other containers."

"Last summer under my direction seven such needles were made, five containing approximately eight mgm. of radium and two, five mgm. each. The needle consists of a sharp pointed steel gold-plated hollow tube with a ring at the end opposite to the point. The ring and the blunt end of the needle are firmly and smoothly soldered to the hollow part after it has been filled with radium. The steel wall is 0.3 mm. thick, and the gold about 0.01 mm. Iridium points are preferable, and in my next needles I expect to make use of them, but this time the iridium was not easily obtained without some loss of time, and I was in a hurry to make use of the needles for a special case which was then waiting. They are especially adapted to tumors of the thyroid, various isolated enlarged glands, as well as for the various tumors of the breast. So far I have used them for two carinomatous glands of the neck, two cases of isolated glands, and one case of sarcoma of the humerus involving the whole circumference of the bone, as well as in the tuberculous glands in the axilla."

"The needles can, of course, be inserted in the tissue of the circumference of a large tumor at equal intervals, radiation thus taking place in all directions from each needle as a center. This is theoretically at least, a very desirable way of getting the effect of the radium."

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Frederick L. Hoffman, LL.D., The Mortality from Cancer Throughout the World. The Prudential Press, 1915. Radium and Radiotherapy, pp. 209-212. "A thoroughly qualified statistical inquiry into the results of cancer treatment would make an extremely valuable contribution to the cause of cancer research. A large amount of statistical information has been published on the results of surgical operations, but the methods of statistical analysis have, as a rule, been crude and often not free from serious technical objections. In the case of the non-surgical treatment of cancer the statistical considerations are even more involved, and the conclusions advanced are less to be relied upon as impartial and accurate. The underlying reason is to be found in the widely varying and statistically ill-defined principles of medical and surgical practice; in other words, it is extremely difficult, if not practically impossible, to reduce the cases considered to an absolutely comparable basis. For illustration, one institution may treat largely inoperable cases as a matter of charity or positive necessity; another institution may treat only such cases as upon thorough examination warrant an exceptionally favorable prognosis; yet the first of the two might actually be better administered and yield relatively more favorable results than

the second. It is therefore obvious that statistical conclusions regarding methods of treatment require to be accepted with extreme caution."

"These observations apply with special force to radiotherapy as a possible solution of the apparently hopeless problem of an effective cancer cure by other means than radical surgical interference. The subject of radium, however, has attracted so much attention within the last few years that it has seemed advisable to include a brief discussion of it, regardless of the rather doubtful value of the statistical evidence available at the present time. The opinion has been expressed by Mr. A. E. Hayward Pinch, the medical superintendent of the Radium Institute of London, that "No useful purpose would be served by a minute analysis of the statistics, for, as observed by the British Medical Journal, "the stages and extent of the disease vary so much from case to case that only a very large number would warrant the use of the statistical method." Subsequently, however, some very interesting statistics have been published by the Institute, which will presently be discussed in some detail. It requires to be kept in mind that the modern surgical treatment of cancer is unquestionably much more effective than the surgical practice of the past and that the results obtained are in almost precise relation to the previous duration of the disease, or, in other words, to the attained size and degree of infiltration of the cancerous mass into the adjacent tissue through the regional lymphatic glands. The average surgical results, under normal conditions, have been summarized by Dr. Isaac Levin, in the following statement:

"Only in carcinoma of the lip the radical cure by the aid of the so-called block dissection of the tumor and the regional lymph glands is as high as 70 to 83 per cent. In carcinoma of the breast Halstead, who is one of the best operators of this condition, reports that 38.8 per cent. of the cases which were operated remained well for three years and over. Since not all the cases examined were operable, probably not more than 30 per cent. of the cases of carcinoma of the breast can be cured by surgery alone. In regard to carcinoma of the uterus, Wertheim, the greatest authority on the surgical treatment of this condition, states that about one-half the cases which come to him are operable and of these about one-half are cured by the operation, consequently about 25 per cent. of the cases of carcinoma of the uterus may be cured by operative treatment. Wm. J. Mayo, who is one of the most brilliant operators in the world, reported recently on 996 cases of carcinoma of the stomach. Of these 344 cases only were operable, and of the latter 25 per cent. remained cured five years and over after the operation. In other words, about 9 per cent. of cases of carcinoma of the stomach can be cured by surgery alone in the hands of a Mayo and probably an even smaller percentage in the hands of most other surgeons. In all rather less than 30 per cent. of cancer patients can hope to be cured by the aid of surgery alone."

"It must be admitted that these results are disappointing, considering the high degree of surgical efficiency on the part of those who are rightfully considered the master minds of the surgical profession, but Dr. Levin is far from being justified in his conclusion that "It is also safe to assume that there can hardly be expected any further progress in surgical treatment of malignant tumors," for the self-evident reason that in the past the large majority of the cancer patients obtained surgical treatment at a time when the cancerous growth had probably reached

the inoperable stage. These observations seem called for in view of the reasons advanced in behalf of the radium treatment as a substitute for surgical interference, even though evidence is wanting to prove that radiotherapy would be applicable to the large majority of deep-seated cancers, which cause the major portion of the aggregate mortality from malignant disease."

"Radiotherapy is a branch of physiotherapy, which includes treatment by heat, light, electricity and radio-activity A brief outline of the principles of physiotherapy in its relation to cancer is obtained in the treatise on "The Cancer Problem," by William Seaman Bainbridge, who refers to the discovery of Roentgen rays in 1895, which were also first employed in the the treatment of malignant disease. Elsewhere in this work reference has been made to X-ray dermatitis, or skin cancer, due to the action of the rays, met with among Roentgen-ray workers. In moderate forms of cancer, however, the application of X-rays has been beneficial in treatment, but the statistical data are far from sufficient and conclusive. The discovery of radium and radio-activity by Mme. Curie dates from 1898-1900. The general principles of radiotherapy have been elaborately set forth in a work by Wickham and Degrais, translated by Dore, with an introduction by Sir Malcolm Morris. The therapeutic results discussed in the work are illustrated by a large number of colored photographs of cases before and after treatment. Most of these cases represent external or superficial cancers, and but a few are derived from gynecological experience. In a subsequent treatise on radium, as employed in the treatment of cancer, angiomata, keloids, etc., the same authors present much additional evidence, but again most of the illustrations are of superficial cutaneous cancers, which would naturally be most likely to yield satisfactory results."

"The statistical interpretation of the facts presented by these and other authors on radiotherapy is as yet far from convincing. The first annual report of the Radium Institute, published in the British Medical Journal, under date of January 25, 1913, includes 657 cases, but of these a large number were not malignant disease. Of the carcinomata and sarcomata not a single case was reported as cured; but out of 447 cases treated, 44, or 9.8 per cent., were reported as apparently cured; 137, or 30.6 per cent., as improved; and 52, or 11.6 per cent., as having died." (The author fails to add that practically only *inoperable* cases of malignant disease were treated.—Ed.)

"A review of the recorded observations on individual cases warrants the conclusions that radium is unquestionably an effective method of treatment in superficial cancers, particularly in the earlier stages of the disease. The results of the treatment, however, are largely dependent upon the quantity of radium used. Failures are more likely to be attributable to the insufficiency in the amount of radium available than to any other cause, at least in patients in a far-advanced stage of the disease. These conclusions, however, apply, as yet, almost exclusively to superficial cutaneous cancers, which cause but a small fraction of the aggregate annual loss of life. There has not been sufficient time to observe the after-effects of radium treatment in a large enough number of typical cases. The statistical experience data have also not as yet been subjected to an extended critical analysis, with a due regard to the organs and parts of the body affected or the specific types of the disease and the degree of cancerous involvement. Nor has the question of joint results in operative and radium treatment combined received adequate

attention. There would seem to be much ground for accepting the conclusion that the best results, at least in internal cancers, are likely to be obtained, first, by surgical interference, and, second, by subsequent radiotherapy."

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Howard C. Taylor, M. D. The Radical Operation for Carcinoma of the Uterus. Abstract of a paper presented before the Section on Obstetrics and Gynecology, New York Academy of Medicine. Trans. of N. Y. Acad. of Med., Am. Journ. of Obstetrics, LXXIV, 144-6, July, 1916. "Dr. Taylor said that his treatment of carinoma of the cervix uteri was as follows: (1) For the favorable cases, a patient in a good general condition, an abdominal wall without an excess of fat, and no associated pelvic lesion to increase the operative risk and a limited growth, he advised the radical operation. (2) For a limited growth in a patient who was a bad risk on account of general or local conditions, he advised usually a simple abdominal hysterectomy, occasionally a vaginal hysterectomy. (3) For the so-called inoperable case, he advised radium, X-rays and the cautery. In this class because of the favorable reports that were published following the use of radium, X-rays and the cautery, he included cases that formerly he submitted to operation. If after the use of radium, X-rays or the cautery the case became operable he removed the uterus."

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A Martin (Berlin). Radiotherapy in Cancer of the Uterus, Jahreskurse fuer arztliche Fortbilding, July, 1915. American Journal of Surgery, XXIX, No. 10, October, 1915 and XXIX, No. 11, November, 1915. "The influence of the radioactive substances on the histological structure of tumors is the same, no matter what form of radio-energy is employed; thus the studies of Aschoff with X-ray, Haendly and Weinbrenner with mesothorium, Doederlein with mesothorium and X-ray, Exner, Wickham, Degrais, and Bellot with radium, have all shown practically the same effect on the tumor cells. In general the formula suggested by Bergonnie and Tribondeau for the sensitiveness of cells to rays has been verified by the other investigators. Thus it has been shown, that the cells are the more sensitive to the ray: 1, the greater their reproductive activity; 2, the longer their karyokinetic phase, that is, the more remote they are from their mature state; 3, the less defined their morphology and formation."

"Von Hansemann and Schottlaender have shown that there is nothing specific in the effect of the ray on the histological picture. The pictures often show changes frequently seen in rapidly growing or rapidly disintegrating tumors, but this can be seen only by examining pieces for diagnosis and comparing them to the extirpated tumor or to excised particles which latter show these pictures. The effect on normal tissues is practically the same as on pathological tissues; at first there is hypertrophy; then necrosis of cells and bacteria; followed by absorption; then replacement by scar tissue. This is the same in both animals and plants, as well as in human and animal tumors (Keyserling). These changes are induced by the so-called irritation doses (Reizdosen). Sachs warns against these milder doses because they may stir up to greater activity the deeper-lying carcinoma cells instead of being inhibited in their growth and even destroyed, as are the more superficial lying cells;—they may

even take on an increased activity. Von Franque has demonstrated this in a convincing way: All rays decrease in effect in proportion to the square of the distance from the ray-source. Certain amounts of the ray are absorbed by the exposed tissues; of the gamma ray, of mesothorium, of radium, 40%; of the roentgen-ray 30%, for one centimeter of tissue layer (Keetman). The limit of the penetrating effect of the ray does not seem to exceed ten centimeters. Part of the residual X-ray may penetrate still further; according to Lazarus, as much as a meter in depth."

"A selective effect, in the sense that only carcinoma cells are destroyed, has not been demonstrated for any kind of ray. There is, however, a certain tendency of the ray to destroy carcinoma cells—to replace connective tissue by stimulating increased activity. Upon normal epithelial cells, there was practically no effect. If the ray intensity is not sufficient, the carcinoma may even be stimulated to greater, more active proliferation, which sometimes becomes very intense. If the ray intensity is excessive, the neighboring tissues may also be destroyed. Aschoff, Kroenig and Gauss have reported necrosis due to burning of the intercostal muscles in a case of mammary carcinoma, of the superficial layers of lung and of small areas of liver (found at autopsy). Possibly, this will not occur with the employment of the newest apparatus. Bumm, however, says this danger has been practically eliminated."

"Clinical manifestations.—Frequently there is noticed a swelling and hyperemia (inflammatory signs) of the tumor. Secretion is increased; suppuration and hemorrhage decrease, in fact cease altogether; the secretion becomes oderless and serous. This also disappears in a few weeks, occasionally more rapidly, at times more slowly. The proliferation gives way to shrinking. The ulcerated mass becomes epidermalized, The vaginal portion takes on a normal form. Sloughing is evidence of excessive dosage. By and by the vaginal vault becomes narrower, the vaginal portion disappears, giving the impression of senile atrophy of the genitals. Infiltrated parametria begin to show hard indurations. Pains disappear with surprising rapidity. Amenorrhea and shrinking of the ovaries result. The ova cells are more noticeably sensitive to the ray than carcinoma cells."

"This local change, is as a rule, accompanied by a remarkably rapid improvement in the general condition. Cachexia and anemia disappear; the body weight increases under better nutritional activity; general efficiency and capacity for work return."

"In another series of observations the opposite condition obtained, whether with smaller or larger doses, lassitude, weakening, febrile state, nausea, vomiting, anemia, due to the direct effect of the ray on the red blood cells."

"Kolde and Martens observed when large doses were used, a decrease of one million to the cubic centimeter with diminution in hemaglobin and erythrocytes (Schauta). This is probably due to the absorption of toxic proteid-by-products from the affected carcinoma, which may have a jeopardizing effect on life."

"The bladder is often badly affected—ardor urinæ is ushered in, enuresis also; mucous discharge and tenesmus are frequently observed. These disappear when small or moderate doses are used. These untoward symptoms have obviated by improved technic. Stricture of the rectum which necessitates artificial anus, recto-vaginal fistula (two cases of Bumm's reported at the Halle Congress died of urinary infiltration

following bladder necrosis and suppuration). Heynemann showed cystoscopically that in more than two-thirds of all the cases there was bulbous edema of the bladder walls and the ureter orifice. In two cases there was extension of the carcinoma upon the bladder wall. The danger of stricture should be borne in mind. Bucky reported an autopsy of a case 5 months after intensive raying. There were ulcers on the buttock several centimeters deep; also over the mons veneris. At the same time an extensive cervix carcinoma had broken through into the bladder. Halban reports a fatal hemorrhage from an erosion of the hypogastric vein 27 days after inserting 27 mg. of radium into a recurrent tumor of the parametrium. But the filter capsule instead of being of lead should be of brass."

"Cheron, Rubens-Duval use platinum and gauze surrounding it (30 layers of gauze). There is no question that a large part of the injury is due to imperfect apparatus. These are avoided by improved technic."

"Technic. The dose of radium and mesothorium has been worked out chiefly by Doederlein. The minimum dose, according to him, should be for carcinoma of the uterus, 27 mg. of radium element or mesothorium. In very large cervical cancers occasionally 100-150 mg. were inserted. This is left in situ for twenty-four hours, at first is repeated at two weekly intervals, later at three to four weekly intervals. The filter used was brass lined with rubber To prevent injury of the vagina and rectum the filter capsule was placed into an appropriate portion of a kolpeurynter adapted to the size and elasticity of the vagina. The bag was filled with lysoform in each case. A thorough excochleation of the cancer is made before the radium or mesothorium application. The results are better in the more superfical growths. The infiltrating types of cancer are as resistant and unfavorable as they are to surgical operations."

"In February, 1915, Doederlein reported twelve cases of inoperable cancer which were entirely well one year after cessation of treatment."

"The Schauta Klinik, Vienna, uses radium in operable cases and in operable cases that refuse surgical treatment. Excochleation by means of the Paquelin cautery is done at the beginning of the treatment. Then 27 mg. of radium is introduced for twelve hours, with intermission of twelve hours to several days. The first series consists of five applications after three weeks to a month a second series of four or five applications is begun, and if necessary is followed by a third series of five sessions. The dose decreases after each series. Where superficial effects are desired, the filter is lead, in certain small tumors the filter is of gold, while for deeper effects platinum or brass is used."

"Of thirty-four cases treated by this technic, eighteen completed the full course of treatment. One died of pyemia with multiple lung abscesses—the carinoma was no longer macroscopically visible. Three women remained unimproved; fourteen were considered to be primarily cured. Nine cases were carcinoma of the cervix, two of carcinoma of the body, two of carcinoma of the rectum, and one carcinoma of the vagina. In no case were untoward symptoms noticeable, i. e., outside of slight temperature elevation, mild cystitis and transient loss of appetite and disturbance of the bowels, as well as backache and abdominal pain. In general, the discharge and hemorrhage ceased promptly, the pains rapidly improved, the general condition, blood-picture and body-weight improved. No fistulæ were observed. The course of treatment lasted 1½ to 2½ months. Observation of these patients up to the time of publication was 6 to 10 months."

"The Schauta Klinik does not regard their technic as by any means perfected. They also employ as prophylactic measure radium in 27 mg. doses about 10 days after carcinoma operation. The application lasts 10 hours and is repeated at intervals of a month."

"G. Klein has combined the use of mesothorium or radium with the intravenous injection of chemical substances such as enzytol and radium barium selenat (Merck) with the Roentgenization. Enzytol appears to lead to skin-burns because of its sensitizing effect on the skin. The future will best determine the value of such combined treatment. Of Klein's series of 100 cases (25 operable uterine carcinoma, 59 inoperable uterine carcinoma, and 16 breast carcinoma); 28 were so far cured, partly primary, partly secondary; 30 were improved, 11 were worse, 23 died, of whom the terminal end in 8 cases is unknown. Klein finds his method contraindicated in very large cancer or sarcoma of the body of the uterus, and even dangerous in mammary carcinoma, with massive infiltration of the axillary glands which probably involve the large vessels and nerves."

"The expense of the treatment, according to Sachs, to the practitioner of the individual case receiving 7,000 X approximates about $750. Van der Welde confirms these figures out of his own experience. He also notes that the difference in expense as claimed by the manufacturers, and so encountered by the practitioner, is a vast one."

"The end result: So far one may speak only of primary results with Roentgen and radiotherapy. With the increased, very large doses it may be possible to achieve secondary and permanent results. By means of radium and mesothorium treatment, post-operative in 58 cases of uterine cancer, Scherer succeeded in keeping 48 cases free from recurrence three years after operation. The permanent results will naturally improve the smaller is the primary operative mortality. Thus Schauta's very satisfactory results with his improved radical vaginal cancer extirpation the past six years was only 4 per cent."

"Operation vs. Raying of Operable Uterine Cancer.—Some authors have stopped operating operable cancers of the uterus and have begun with actinotherapy. Thus Amann, Klein and others claim satisfactory results without first extirpating the uterus. Hofmeier, however, has had at least one most disastrous effect from a combined primary treatment of an adeno-carcinoma of the cervix with radium and Roentgenization. The tumor in this case was favorable for operation. After three weeks' treatment, during which 2,000 mg. hours of radium and 250 X of Roentgen-rays were given, Hofmeier was obliged to operate and found a great activity of the growth. Despite further radium treatment and Roentgenization, in all 30,000 mg. hours and 2,630 X during a period of four weeks following operation the metastases were overwhelmingly widespread. Fehling takes a very cautious attitude towards primary radiotherapy, and Von Franque shares the same feeling."

"There is a great number of women alive today who owe their life and well-being to ray-therapy. In operable cancer of the uterus actinotherapy has proven of undoubted benefit; in operable cases a similar therapeutic value of the X-ray, radium and mesothorium remains yet to be established."

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Clarence W. Lieb, A.M., M.D. The Nauheim Treatment as Given at the Glen Springs. The Canadian Practitioner and Review, XLI, No. 4, pp. 145-154, April, 1916. "The following chart shows that, in

addition to their valuable mineral constituents, The Glen Springs (New York) are radio-active;

Springs.	*Mache Units per Liter of Water.*
Nauheim (Brine No. 1)	68.
Brine No. 2.	13.
Deerlick	2.89
Salubria	.64
Kissingen	Trace

"Dr. J. S. Shearer, of Cornell, who tested The Glen Springs for their radio-activity, says in a recent report: "Samples No. 1 (Salubria) and No. 4 (Deerlick) are quite similar to Saratoga Springs, while Sample No. 2 (Nauheim) seems to be three times as active as the highest American Spring previously reported."

"The value of 68 Mache Units for Sample No. 2 shows the radium emanation in equilibrium with the dissolved radium salt, hence this amount of emanation may be obtained from each liter of water every thirty days or half this amount every 3.85 days. As the salt is in solution the water may be boiled down or otherwise evaporated and will show concentration of the radium content."

"From the above it will be seen that the Nauheim Spring at Watkins, N. Y., contains nearly three times the amount of radioactivity of the next highest radio-active spring in this country and over twice as much as the strongest spring at Carlsbad or Neuheim, springs long noted for their therapeutic power."

"It has been demonstrated that the development of diseased processes in tissues has been checked by radium rays and under certain conditions regeneration established. It is a notable fact that most springs which for years have been conspicuous for their therapeutic value are radioactive and vice versa that the most radioactive springs of which we know have long been famous for their "healing powers."

"It is a fact familiar to all that the use of mineral waters has produced much of the charlatanism in medicine and that there has been altogether too much ceremony and ritual about their use. It would only be contributing to this regretable chapter in medicine to exploint The Glen Springs without well founded claims. The results obtained, however, by the use of this water have impressed many observers as being out of all proportion to that which can be explained by the mineral content of the water or its mere physiological application. The discovery of the high radium emanation from the Nauheim Spring, and the fact that it contains radium salt held in solution, thus furnishing a constant source of emanation and not a mere transient ebullition of this gas, may account for their remarkable healing powers which until recently, have only been proven empirically. It is the purpose of this paper, however, to discuss the use of these waters only as they are used in connection with circulatory disturbances, yet it must necessarily follow that a water containing such a potent element as radium salt in solution in addition to its other valuable mineral constituents must be a very important adjuvant in producing those tissue changes which it is the end and aim of the Nauheim treatment to effect. There is good experimental evidence confirming this deduction, even when artificial radio-active fresh water is used."

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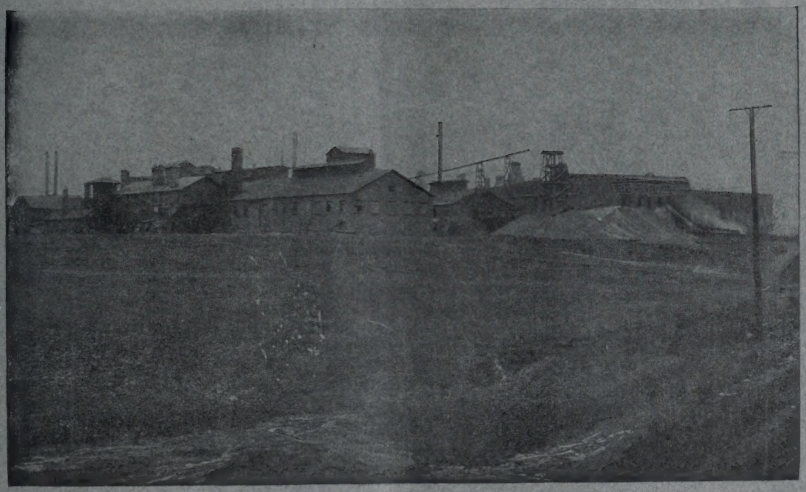

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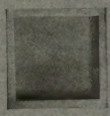

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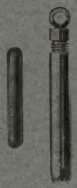

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